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sold to purchasers for extraction of major forest produce but the extent of this is very limited in Kerala, Whereas for the whole of India about 75 per cent of major forest produce is extracted by the purchasers, in Kerala only about 15 per cent of forest is extracted by the purchasers directly, the rest being entrusted to departmental extraction.

4.14 The procedure in case of sale of timber and poles is to offer them first to the Government Departments and to sell only the surplus by open auction. The result is that while the Government Departments are able to obtain timber at reasonable negotiated rates, the trade obtains timber at very heavy rates.

4.15 In case of firewood, Messrs Forest Industries (Travancore) Ltd. (F.I.T.) have been given a concession for extraction of firewood for supply to M/s Fertilizer and Chemicals (Travancore) Ltd., Alwaye. The latter are now switching on to oil and, therefore, other uses shall have to be found for firewood extracted by the F.I.T. whose concession has still to run a number of years. Firewood supplies to the main cities come from the forest coupes which are sold to purchasers in auction after extraction of the timber. No area is managed purely for raising firewood as in some other States of India.

4.16 Unlike the major forest produce whose removal is done mainly through the Government agency, extraction of minor forest produce is mostly done through the purchasers. As may be seen from Appendix 6 Government earned only Rs. 50,000 as revenue through sale of minor produce while it earned about Rs. 5 lakhs in the form of royalties from purchasers.

Silvicultural Systems

4.17 Kerala is unique in having working plans for all the Government owned forest areas in the State. Since all the Government forests are managed under the latest scientific systems, there is hardly any danger of over-felling in the public sector forests.

4.18 With a wide variety of forests, both natural and artificial, the systems of silviculture practised are suited to the types. The Selection System[1] is the one that is being applied in all the evergreen forests and only the trees of little economic importance are extracted under the simple felling rules. The complex nature of the vegetation and difficulty of regeneration of evergreen species, together with the danger of heavy wild growth have caused these forests to be worked under the Selection System.

4.19 In the other timber forests clear-felling with natural regeneration, supplemented by artificial planting, is being undertaken. The climate and soil conditions are so favourable that there is generally no difficulty in obtaining natural regeneration. The only exception, and it is quite an important one, exists in case of the evergreen forests which are being worked more and more heavily as demand for new species arises in the market. Their regeneration is not keeping pace with the removals.

1. Under the Selection System trees are selected for felling uniformly all over the forest. Under simple felling rules patches of forests are completely cleared in rotation irrespective of age, type or growth of trees contained in that patch.

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number of items of minor forest produce. It is, therefore, suggested that a proper survey of the forest areas should be conducted to assess the extent of minor forest products available in the State. This will bring out the raw material potentialities for the phyto-chemical industry as well as other small scale industries which could be based on the minor forest produce of the State.

Raising the Long-run Forest Potential

4.38 There is not much scope in Kerala for extension of area under forests through afforestation programmes. There are already a number of competing claimants for land use. The proportion of area under protective vegetal cover, as discussed, is also quite adequate in Kerala. What is necessary is to minimize the extent of further in-roads into forest areas by clear felling for cultivation, etc.

4.39 Having ruled out large scale afforestation as a means of improving the forest resources, the only other possible methods, to augment the forest pontential are improvement in forest management and raising of new commercial plantations. Forests under the jurisdiction of the Forest Department are already being managed on scientific lines. The primary need, therefore, is the acquisition of private forests so that the standards of management could be enforced uniformly throughout the State.

COMMERCIAL PLANTATIONS

Teak

4.40 In addition to the existing 75,000 acres under teak, there are 640,000 additional acres of low quality deciduous forests which are suitable for conversion into the valuable teak plantations. This changeover will considerably improve productivity of the deciduous belt. About 9,000 to 10,000 acres can be taken up every year against 2,000 to 2,500 acres being planted annually at present. The technique of raising these plantations has been perfected in Kerala and the present agri-silvicultural method, whereby the plantations are raised free of any cost to the State, may be continued.

Rosewood

4.41 Rosewood is in great demand by the furniture industry. Logs of over 72" girth are also exported, mostly to Italy. The supply is getting exhausted and it is desirable to replenish the stock by raising new plantations. The tree is slow growing. It is, therefore, proposed that it should generally be raised on the periphery of the teak plantations where it can be left to grow for 2 or 3 teak rotations. There should be no extra cost as the plantations are to be raised along with teak by the agri-silvicultural method.

Softwood Plantations

4.42 As a result of the difficulties in the way of regeneration of evergreen forests, the softwood species grown in these forests are in short supply. By the end of the

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*433 313 647 two more Conservators of Forest, one to deal with general development works of the State and the other for the new plantations may be considered. It is also proposed that an additional Chief Conservator of Forests to cope with the heavy work may be appointed as soon as the tempo of development work has gained momentum, say, by the middle of the Third Plan period. The Territorial Divisional Forest Officers should each be given a gazetted assistant to deal with all the development works in their divisions. The present annual expenditure on Establishment amounts to Rs. 8.23 lakhs (1958-59). If the above suggestions are accepted there should be an increase of about 25 per cent. It is also expected that if the tempo of developments is maintained, higher amounts will be needed in the Fourth Plan. The establishment expenditure is, therefore, worked out as under :

Third Plan period	Rs. 10.29 lakhs annually.
Fourth Plan period	Rs. 10.97 lakhs annually.

INVESTMENT AND OUTPUT IMPLICATIONS

*433 313 655 651 4.61 The major part of investment during the coming decade will be on raising the various commercial plantations discussed above. Investment on other items is summarized in Table appearing under Para 4.53. The amount of Rs. 3 crores[1] which is expected to be spent during the Third Plan period on acquisition of private forests, does not appear in the investment figures since the amount is only in the nature of a monetary transfer.

4.62 As a result of the development programmes suggested above, output contributed by the forests may be envisaged to increase from the following sources during the coming decade :

(1) Sale of forest produce from areas clear-felled for teak plantations. This item will be quite substantial.
(2) Income from thinning of teak plantations.
(3) Income from bamboo and eta reed resources, which will start accruing by the end of the Third Plan period when all the flowered areas would have been regenerated.
(4) Income from other plantations would start accruing only towards the end of the coming decade or during the beginning of the Fifth Plan since gestation period before the plantations start maturing is rather long.

4.63 It is difficult to give an exact forecast but taking the above factors into account, the increase in income accruing from forestry during the coming decade is taken to be as follows. It is assumed that income at the end of the Second Plan, that is, during 1960-61 would be 10 per cent higher than that in 1955-56, in 1965-66 twenty per cent higher than that in 1955-56 and by 1970-71 it would be one and a half times the income in 1955-56. On this basis projections for State income from forestry would

[1] The Third Plan has allotted Rs. 3.75 crores for Forest Development which compares quite favourably with investment suggested by us. However, it has to be kept in mind that our figure does not include finances for acquiring private forests, which the State Plan has to provide for.

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be as follows :

	Rs. crores
1955-56	5.0
1960-61	5.5
1965-66	6.0
1970-71	7.5

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4.64 It will be noticed that in the earlier period income is projected to grow at a lower rate than towards the end of the period. This is naturally to be expected in view of the fact that gestation period for growth of forest potential is rather long and the effects of the development programmes will start becoming visible only towards the end of the Fourth Plan period and during the Fifth Plan period. During the Second and Third Plan periods rise in income is expected only from clear felling areas for teak plantations and intermediate felling in the older areas.

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433 442 443 organizational and physical. Most of the fish markets lack such facilities as adequate supply of water, drainage, proper flooring, wire screen, etc. Clean and hygienic conditions for the sale of fish should be created in all the consumption centres. A number of retail and wholesale fish markets should be built at all the major consumption centres. Twenty of these markets may be a good target for the next decade. Provision of fish storage facilities, by way of small refrigerated cabinets is also necessary in retail marketing. The capital cost for building these new markets and providing the storage cabinets would be about Rs. 20 lakhs of which Rs. 8 lakhs may be under the Third Plan. In order to ensure reasonable return to the fishermen it is imperative that cooperative marketing of fish should be expanded as much as possible.

Servicing of Marine Engines

433 504 5.53 The programme envisaged for mechanized fishing will call for adequate servicing and overhauling facilities. The Integrated Fisheries Development Centres, where most of the mechanized boats will be concentrated, should have properly equipped servicing stations. At least three such stations may be established by the end of the Third Plan, and another five by the end of the Fourth Plan. Together, the capital cost of these eight service stations will be about Rs. 4 lakhs.

Cooperatives

226 474 5.54 Fishermen's cooperatives in Kerala are not well developed. Most of the societies are credit societies. Only three cooperative societies are engaged in the manufacture of nets and two in the marketing of fish. Recently some Producer Cooperative Societies have been organized under the auspices of the Fisheries Department. Nets, boats, etc., are owned by these societies and the members carry on fishing on a cooperative basis.

433 226 474 5.55 Simultaneously with the development of fisheries in the next decade, the fisheries cooperative should also be strengthened. The aim should be to bring the majority of the fishermen within the cooperative fold. The Integrated Fisheries Development Centres should all be organized on a cooperative basis, covering all aspects of the industry.

Staff

433 228 647 655 5.56 The Fisheries Directorate appears to be adequately staffed for the work it has to deal with at present. However, the implementation of the expanded programme suggested in this report will not only entail a considerable strengthening of the existing staff, but also require certain new categories of technical personnel. It will be especially necessary to provide an adequate staff to man the mechanized boats and the technical services necessary to operate the boats. A number of training centres should be opened to train the fishermen in the art of mechanized fishing. In addition, each of the Integrated Fisheries Centres should have a trained Marketing Assistant to assist the fishermen and their Cooperatives in organizing the marketing of their catches. It

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6.10 The present method of working these sands is haphazard and extremely short-sighted. The dunes are getting exhausted while the washings are dependent on a good monsoon. A better method would be to work the sand bar itself. This would also be in the interests of (*i*) conservation and (*ii*) ensuring a regular supply of raw sand independent of the vagaries of nature. Even if working of the sand bar suggested above is not taken up now, back filling of pools with sand tailings from mineral sand companies would prove beneficial. It would lead to building up of sand rich in heavy minerals, other than ilmenite. At present the tailings which contain 80 per cent of the original rutile and all the sillimanite and zircon, are dumped into the sea.

6.11 The extraction of ilmenite is done by the mineral sand companies at Chavara. Till recently there were four units, namely, two units belonging to the Travancore Minerals, one to F.X. Pereira Minerals and one to Hopkins and Williams. These concerns were all under private ownership till 1945. Realizing the strategic importance of these sands, the Travancore State assumed control of the sand deposits during that year ; and the mineral concerns continued to work as agents on behalf of the State. A few years later, however, the Travancore Minerals (1951) and F.X. Pereira Minerals (1956) were taken over by the State Government and run directly as State enterprises.

6.12 Hopkins and Williams, however, continued in private hands till 1959. By this time some difficulties cropped up with labour. The firm had also accumulated vast arrears of royalty to the tune of Rs. 28 lakhs. At this stage the management decided to close down the unit. In the interim period their export contracts had also lapsed. As a result of all these developments, there are two mineral concerns at present operating three units, whose total capacity is 1,60,000 tons. In view of the reduced foreign demand for Indian ilmenite, closure of Hopkins and Williams has not created any serious problem.

6.13 The output per man per shift works out to 0.41 ton at the Travancore Minerals Plant and 0.40 ton in the F.X. Pereira unit ; whereas in the Hopkins and and Williams plant, now closed, the output per man per shift was around one ton. This was partly due to a better layout of the machine. In the existing plants much effort and material is lost in transportation from one unit to another. In addition, excessive labour appears to be employed in the plant of the Travancore Minerals (P) Ltd.

6.14 The production of ilmenite rose from 216,000 tons in 1950, to a peak of 314,000 tons in 1956. Since then it has been fairly steady between 270,000 and 290,000 tons. The value has also been going up from Rs. 33 lakhs in 1950 to Rs. 170 lakhs in 1959. The present price is Rs. 60 per ton.

6.15 Ilmenite is mainly used in the manufacture of TiO_2 (titanium) white pigment. TiO_2 is used in various other industries like paper, delustrant in rayons, rubber compositions, plastics, printing inks, cosmetics, etc. Titanium metal is not widely used mainly because of its high cost of production.

6.16 Only a very small portion of the production of ilmenite is consumed within the State in the manufacture of TiO_2. The Travancore Titanium Products Ltd., Trivandrum, utilize about 3,000 tons of this mineral. This plant is expanding its capacity to 10 tons a day by 1961, and will then require 6,000 tons of ilmenite. The

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*433 317 the extensive horizontal spread of this horizon, mining operations are capable of considerable lateral expansion.

[655] 6.34 The china-clay from Quilon and Trivandrum districts is mostly consumed within the State by the Government-run ceramic factory at Kundara and the other privately owned ceramic factories, as well as by the rubber, paper, insecticide and [439] cement (for white cement) industries in the State. A few hundred tons are supplied to consumers in the neighbouring States and a small quantity is also (75 tons in 1959 and 44 tons during Jan.—August 1960) exported to Ceylon. The crockery and sanitaryware plants in the State consume about 1,900 tons of refined clay and another 1,700 tons are used by the insecticide, rubber and paper factories in the State. The china-clay produced from Cannanore district is mostly exported to other parts of India.

6.35 It is worth noting here that India imports textile grade china-clay. Import figures for 1956 and 1957 are 7,282 tons and 4,354 tons respectively. The State could very well fill this gap particularly in view of the excellent quality of the material it possesses. Increase in output to meet this demand should be undertaken from the Quilon district, where large reserves are available.

6.36 Demand for china-clay (in terms of crude material)[1] is likely to be as under by 1965-66:

	(Tons)
For ceramics, inclusive of insulators	9,000
For the rubber, paper and insecticide industries	10,000
For the textile industry	15,000
For white cement manufacture	12,000

6.37 During the period 1966–71, china-clay requirements are likely to go up still further as a result of setting up of another high tension insulator factory and increase in demand from the paper, textile and insecticide industries, and are estimated to reach 70,000 tons in terms of unwashed clay by 1970-71. To meet this rise in demand, mining in the public sector at Kundara can be expanded to produce an additional 13,500 tons by 1965-66. This would hardly involve any mechanization. Along with this, the capacity of the washing plant will have to be increased to 30 tons a day. The expansion of mining operations and installation of additional washing capacity proposed would roughly involve a capital outlay of Rs. 5 lakhs.

6.38 Reopening and development of the mines at Chathanoor should also be considered at a rate of exploitation of 22,000 tons of crude clay per year. A washing plant with a capacity of 30 tons a day would be required at this mine. This mine and washing plant may be operated in the private sector. The capital outlay required would be of the order of Rs. 5 lakhs and the mine and washing plant would together provide employment for 310 persons.

6.39 In order to produce an anticipated 70,000 tons per year by 1970-71, representing an increase of 24,000 tons a year over the Third Plan period, a further expansion of mining operations and additional washing capacity of the extent of 20 tons a day will have to be considered either at Kundara or Chathanoor. The additional

[1] Refined china-clay is roughly one-third the weight of crude china-clay.

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*433 377 into a useful commodity. If this is done, it is possible to visualize that from 1965 onwards the State can be made the seat of bulk hydro-power generation not only for meeting the requirements of its own development programmes, but also for export to neighbouring areas in the southern zone. During the coming decade activities in connection with power development should, therefore, be geared mainly to the need of achieving this objective.

Prior to the Plans

*433 377 655 7.5 The beginning of an extensive power supply system, utilizing hydro-power resources of the State, was first initiated with the establishment of the hydro-electric power station at Pallivasal in 1940. During the years of the Second World War the power system registered significant progress as a result of increased industrial activity in the State. Just prior to 1951, the State had developed a total installed capacity of about 33 MW, of which 14 per cent was in diesel stations and the rest in hydel projects. A 66 KV transmission system covered the State and power was distributed to about 28,000 consumers in 1958 towns and villages.

First Plan Period

7.6 Out of a total Plan provision of Rs. 30.03 crores, the largest share (Rs. 11.4 crores) was allotted to the development of power. Four hydro-electric projects viz., Sengulam Project, the Poringalkuthu Project I Stage, Poringalkuthu Project II Stage and the Nariamangalam Project, were taken up. During the First Plan period, the Mattupatty Dam (of the Pallivasal Project) with a storage capacity of 1,900 million cubic feet was constructed for augmenting the summer flow to the Pallivasal hydel station. The installed capacity of the station itself was raised to 37.5 MW providing for an effective generating capacity of the order of 32.5 MW. The Sangulam Project was commissioned in 1954 with an installed capacity of 48 MW. The Poringalkuthu Project, I Stage, was almost complete by 1956, and the remaining two projects were taken up for execution only during the last year of the First Plan. By 1956, the generating capacity had risen from 28.5 MW in 1951 to 85 MW, and the energy generated from 151 million units to 350 million units. Besides this, the transmission network was further expanded and 744 villages were electrified. An additional 51,456 consumers were connected to the system.

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Second Plan Period

7.7 The share of power was quite large in the Second Plan allocations. Out of the total outlay of Rs. 87 crores, the allotment for power development alone was Rs. 23.45 crores.

7.8 The total expenditure on power was made up of Rs. 11.40 crores for hydro

electric projects, Rs. 4.82 crores for extension of transmission lines and Rs. 7.23 crores for rural electrification-cum-distribution schemes. The physical targets aimed at under the Second Plan were as follows.

A. Additional Generating Capacity		
(i) Poringalkuthu, I Stage		24 MW
(ii) Poringalkuthu, II Stage		8 ,,
(iii) Neriamangalam scheme		45 ,,
(iv) Sholayar project		54 ,,
(v) Panniar project		30 ,,
	TOTAL	*161 MW*
B. Transmission Lines and Sub-stations		
(i) 110 KV lines		388 circuit miles
(ii) 66 KV lines		43 circuit miles
(iii) 110 KV sub-station		4 nos.
(iv) 66 KV sub-station		6 nos.
C. Rural Electrification and Distribution Schemes		
(i) Villages to be electrified		1,344 nos.
(ii) Additional consumers to be served		105,260 nos.

7.9 The capital investment in the Second Plan, till the end of the year 1959, was nearly Rs. 18.75 crores. Almost all the essential items of plant and equipment had to be imported for working the power schemes included in the Second Plan. The foreign exchange component of the cost is of the order of 45 per cent. The difficulties experienced with regard to the availability of foreign exchange during the early years of the Second Plan affected the progress of the planned hydro-electric schemes in Kerala. Further, pending a decision on the riparian rights of Kerala and Madras regarding the waters of Poringalkuthu and Sholayar, the execution of Sholayar hydel scheme had been delayed. Only the Poringalkuthu II Stage extension could be completed by the end of the Second Plan. The first two units of the Neriamangalam scheme, having a total capacity of 30 MW, were also installed. In consequence, as against a much higher target that is, 246.5 MW, the total installed capacity in the system reached only 147.5 MW as shown by the breakdown below in the table :

INSTALLED CAPACITY IN MW

Name of Station	*At the end of the First Plan (By March 1956)*	*Addition during the Second Plan (1956-61)*	*Total (By March 1961)*
Pallivasal	37.5	Nil	37.5
Sengulam	48	Nil	48.0
Poringalkuthu I Stage	—	24	24.0
Poringalkuthu II Stage	—	8	8.0
Neriamangalam	—	30	30.0
TOTAL	*85.5*	*62*	*147.5*

7.10 Owing to non-commissioning of the Panniar and Sholayar projects, sufficient water was not available for running the machines to their rated capacity either at Poringalkuthu or Neriamangalam. Consequently, by the end of the Second Plan,

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433 377 effective capacity was only around 84.5 MW. This will rise sharply with the execution of Panniar and Sholayar schemes during the early years of the Third Plan.

655 7.11 The position at the end of the Second Plan was as follows :—

Transmission, Distribution and Rural Electrification schemes had made good progress. The works which were completed include:

(i) the 110 KV Sengulam-Pallom-Kundra double circuit transmission lines and the 110 KV sub-stations at these places;

(ii) the 110 KV Neriamangalam-Alwaye-FACT double circuit transmission lines;

(iii) the 110 KV Sholayar-Poringalkuthu double circuit transmission lines;

(iv) the 66 KV single circuit line from Viyyur and Palghat; and

(v) the 66 KV sub-station at Peermade, Thiruvalla, Alleppey and Vythilla and 33 sub-stations at Karumagappally.

Besides a carrier communication system linking all the generating and receiving stations and the headquarters of the State Electricity Board was completed and taken into service. In the sphere of rural electrification, the benefit of electricity was further [365] extended to 1,003 centres, additional 97,662 consumers were connected to the system and 57,282 street lights were installed in various parts of the State.

GENERATION AND UTILIZATION OF ELECTRICITY

433 377 7.12 Table 33 summarizes the progress of electric power generation and utilization in the State of Kerala during the period 1954-55 to 1958-59. Some of the characteristics are worth noting. Of the total available electrical energy, about 20 per cent is lost in transmission and distribution or used for power station auxiliaries (all India 17.5%). Of the rest, as could be expected, industries are the most important consumers. They account for about 65 per cent of total electricity consumption in the State, the comparable proportion in the country being 50-55 per cent. Next in order of importance is domestic lighting which absorbs about 6.5 to 8 per cent (all India about 10%). The proportion of power used for irrigation has varied between 2 and 4 per cent of the total. Pumping out of water from the water-logged areas of Kuttanad is one of the main source of utilization of electricity in the sphere of irrigation.

7.13 Apart from these, two other important points may be noted : (i) Practically all the energy generated (97-98%) is from the hydro-electric power stations. This is in marked contrast to the pattern of power generation in the rest of India where roughly 55 per cent of electricity is from thermal sources. However, unlike the rest of India where it is necessary to have thermal stations to stabilize supply of power throughout the year, in Kerala because of an exceptionally well distributed rainfall and consequently assured supply of water over the different seasons, there is no such necessity and (ii) It is significant that the load factor has been steadily increasing during the recent years. The units generated annually per kW of installed capacity reached a figure of 4,400 during 1958-59 from 3,200 in 1954-55, that is, the load factor increased from 37 per cent to 46 per cent. Additional demand for power since 1954 has been met, almost entirely, by more intensive utilization of the existing capacity.

2 [Table 33 appearing on pp. 292 of the text, has not been processed — Analyst]